1992

Observers Newsletter

THE METEOROLOGICAL OFFICE NEWSLETTER FOR CLIMATOLOGICAL OBSERVERS

The Met Office

MARCH 1992 ISSUE 21

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THE METEOROLOGICAL OFFICE NEWSLETTER FOR CLIMATOLOGICAL OBSERVERS

EDITORIAL

Another Newsletter! Doesn't time fly when you're enjoying yourself?

As, I hope, you've noticed we have now moved into the Headquarters building. We have a nice bright room overlooking the carnage on the roundabout. If you didn't receive our change of address please see page 2.

Thanks to all those who sent back the 'HELP' questionnaire. As yet there is only an empty desk where our all singing, all dancing computer will reside. When it does arrive (and George and I have slaved over the database entries (sound of violins)) I'll send out copies of what's in there to all the stations who requested their own details.

As for the Hazardous Weather Watch! Well, what can I say? Nothing! That's all I know at the moment.

Have you seen your FREE GIFT on the back page? It should be a help to any of you who find checking the temperatures, on the 3208B, confusing. Many thanks to Mr Eric Marrison for his 'invention'.

For us town dwellers there is an article from Mrs Sally White, at Arthog, on page 13 which will make us all jealous. (Well, it did me anyway). On page 12 is an interesting article from Rothamsted and George Spence has put down his thoughts, after 2 years of Climatological Station Management on page 10. There are local averages from Ashover, Canwick and Halesowen and letters from Presteigne and Minehead.

I seem to spend a lot of time apologising to you all so why stop now? It would seem that:- a) our stores have been short of equipment through most of the year (screens, raingauges and even thermometers!), and b) the forms store ran out of muslin & wicks before the annual forms issue. There's not much I (or anyone else, it seems) can do about our own stores but I have enclosed muslin and wicks with this Newsletter. If you are short of anything else just let me know.

Talking of equipment, how is your screen? If it's a fairly new one is it in need of painting regularly? Is it falling apart already? Please let us know as we're trying to make a case for some kind of low maintenance, plastic screen to be issued.

Thank you to everyone who contributed to this edition and to George for all the typing he has done. All articles for the NEXT edition (if possible, in by December please) will be gratefully received!

Finally, I'd like to welcome all the new stations to the network and say a sad farewell to those, such as Hurley, who will be leaving us this year.

MISS SHIRLEY CHARGE

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CONTACT POINTS WITHIN OBSERVATION PROVISION BRANCH

SURFACE NETWORKS GROUP

Section: Climatological Station Management

Function: Liaison with observers.
Queries on running a meteorological station.
Supplies of stationery, forms, equipment, sunshine cards and pocket registers.
Site visits and changes.

Staff:
George Spence Ext. 4456
Shirley Charge Ext. 4522

Address:
Meteorological Office
Observation Provision Branch (1a)
Room 105
London Road
Bracknell
Berks.
RG12 2SZ

Telephone: Bracknell - 0344-85 plus the extension number.

COMPUTER DATA ARCHIVING GROUP

Section: Quality Control.

Function: Collection and quality control of climatological data.

Staff:

Jack Taylor	Ext.819
Bruce Hancock	Ext. 6634
Dave Forrester	Ext. 6822
John Spafford	Ext. 6823
Jan Lewandowski	Ext. 6824

Address:
Meteorological Office
Observation Provision Branch (3a)
Room 135
London Road
Bracknell
Berks.
RG12 2SZ

Telephone: Bracknell - 0344 85 plus extension number.

Royal Meteorological Society Field Study Courses on Weather

COURSES IN 1992

Mountain Weather 3 - 8 April **Cost TBA**

Directed by Mr D J George. formerly of Cardiff Weather Centre, in conjunction with the Sports Council!

A course for those who go into the mountains for work or leisure, including leaders of parties.those working for Mountain Leadership Instructor qualifications. Duke of Edinburgh Award work, etc. and those connected with the National Curriculum work in Geography or Physics.

Further details from the Advanced Field Study Centre. Ty-r Morwydd, Pen y Pound, Abergavenny, Gwent HP7 5UD

Understanding Snowdonia's Weather 12 -17 April **From £140**

A *new course, led by Mr D J George, formerly Cardiff Weather Centre.* For those who lead walking groups in mountainous areas, and others interested in work or leisure in mountains. Further details from course organiser: Twm Elias, Snowdonia National Park Study Centre, Plas Tan V Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd, LL41 3YU.

Understanding Weather 31 July 7 August **£199**

Malham Tarn Field Centre, Yorkshire. Directed by Dr Keith Weston, University of Edinburgh, and Dr David Warren. A course in which you are immersed in the weather and all things meteorological in beautiful surroundings 1300 ft up in the Yorkshire Dales. A full week's programme of talks, outdoor work and films includes learning about weather satellites, a forecasting competition and the launching and tracking of hydrogen-filled balloons. Useful for GCSE teachers and students.

Weather and Climate 26 August - 2 September residential **£199**

The Leonard Wills Field Centre, Nettlecombe Court, Somerset. Directed by Dr Bob Riddaway and Dr Geoff Jenkins, Meteorological Office. Do you want to understand the weather and find out how to make your own weather forecasts? Do you want to track weather balloons? Do you want to understand the debate about global warming and other environmental issues? If you do, this is the course for you. The course is suitable for anyone with a lively curiosity and an interest in weather and climate. It is useful for teachers and students.

Weather and Bird Migration 6 -1 1 September **£165**

Gibraltar Point Field Station, Skegness, Lincolnshire. Directed by Mr Malcolm Walker and Mr Al Venables, University of Wales College of Cardiff. This course is intended for bird-watchers who wish to study the ways in which migrations, populations and flight patterns of birds depend upon weather and climate. Much of each day is spent in the field; and the aim is chiefly to relate the species seen, and their numbers, to the current weather situation.

Weather Under Sail Aboard "Hoshi" 19 - 26 September **£395**

Directed by Mr Bill Giles, BBC Weatherman. Run in conjunction with the Island Cruising Club. Sailing from Salcombe in Devon, the course takes place aboard the Club's 86ft classic Edwardian schooner "HOSHI", with berths for 9 plus Course Leader, Skipper and Mate and more importantly the full-time Cook. The destination will be the waters of the English Channel, and you will learn not only about meteorology afloat, but also about sailing a traditional gaff rigged boat, from measuring weather elements to influencing the ship's course on the basis of your forecast

Understanding Mountain Weather 2 - 3 May 10 - 11 October **£96**

Directed by Mr D J George, formerly of Cardiff Weather Centre, in conjunction with the Sports Council.

Weekend courses for those who go into the mountains for work or leisure, including leaders of parties, those working for Mountain Leadership Instructor qualifications, Duke of Edinburgh Award work, etc. and those connected with the National Curriculum work in Geography or Physics. Includes one field trip and informal lectures.

Bookings including deposit of £50, deducted from course fee of *1961* to National Centre for Mountain Activities, Plas-y-Bremin, Capel Curig, Gwynedd. LL24 OET

For further details of the above courses, please write, stating *your specific interest to:*

The Executive Secretary, Royal Meteorological Society, 104 Oxford Road, Reading. Berks. RGI 7W

CO-OPERATING OBSERVERS COURSES 1992 - 1993

Here is the programme for the 1992-1993 academic year. This is just to give you prior notice, so that you can be prepared when the application letter arrives.

COURSE	DATES	PLACES
CO 1	MON 11 JANUARY — FRI 15 JANUARY 1993	15
CO 2	MON 15 MARCH — FRI 19 MARCH 1993	15
CO 3	MON 22 MARCH — FRI 26 MARCH 1993	15
CO 4	MON 14 JUNE — FRI 18 JUNE 1993	15
CO 5	MON 28 JUNE — FRI 02 JULY 1993	15

There are still places available on the following courses. A phone call will get you a place! Call 0344 854522.

C03 ———— 22nd – 26th JUNE 1992
C04 ———— 6th – 10th JULY 1992

The Meteorological College, Shinfield

NEWS of STATIONS

Stations Closed in 1991

TRAWSCOED (Dyfed)
A MAFF station, closed end of February.

NORTH HEATH (W Sussex)
School of Agriculture having financial problems. Closed February.

TAUNTON (Somerset)
Borough council says loss of present site and staff shortages mean that observations cannot be continued. Closed February.

CODFORD (Wiltshire)
Was to be run by Semundo Ltd. but land purchase fell through. Closed February.

SLEETBECK (Cumbria)
Ill health prevented the opening of this station in March.

STAINBURN (Cumbria)
Retirement of Archdeacon the Venerable T R B Hodgson and his move to a new home caused the closure of this station in June.

CREWKERNE (Somerset)
The department of the Wadham Community School which took the observations was closed in March.

ST AUSTELL & FOWEY (Cornwall)
Mr Quinn, the main observer for both stations, retired and Tendring Dist. Council could not find a replacement. Closed in April.

WINGERWORTH (Derbyshire)
Dr I R D Proctor, the observer, has moved to Strete and has restarted reporting from there. Closed in June.

HARWELL (Oxfordshire)
Anemograph station. Closed in June.

MORETON MORRELL (Warwickshire) – Automatic station set up in 1988 but observations not received and system not now working. Closed in September.

BRENT PELHAM (Hertfordshire)
Observer unable to do the job to proper standards. Closed in September.

BRESSINGHAM (Norfolk)
No staff available to do observations, especially at weekends. Closed in October.

PENCELLI (Powys)
Returned to the Climatological network in June, after a few years as an Auxiliary station, then found that staff shortages made it impossible to continue with observations. Closed in October.

BLYTH (Northumberland) - Anemograph station. Closed in October.

SITTINGBOURNE (Kent)
Became an Automatic station but was unable to report in CAWS format. Closed in December.

WIXOE (Essex)
Became an Automatic station but was unable to report in CAWS format. Closed in December.

ASHBOURNE (Derbyshire)
Sadly the observer, Mr E Wood, passed away. Closed in December.

NEW STATIONS

During March 1991

COTON IN THE ELMS (Derbys.) - A private farm site run by Mr M J Deakin.

During June 1991

CARLTON IN CLEVELAND (Cleveland) - A private station run by Mr M Cinderey.

During July 1991

PENHALVEAN (Cornwall) - A private farm site run by Mr A M Wood.

SALCOMBE (Devon) - A Health Resort station run by South Hams District Council. The main observer is Mr P Hodges.

During August 1991

BAINBRIDGE (Yorks) - A private farm site run by Mr M Scarr.

GREYSOUTHEN (Cumbria) - A private farm site run by Mr & Mrs R Allison.

During September 1991

FRIZINGTON (Cumbria) - Field Centre run by Mr W Sharrod.

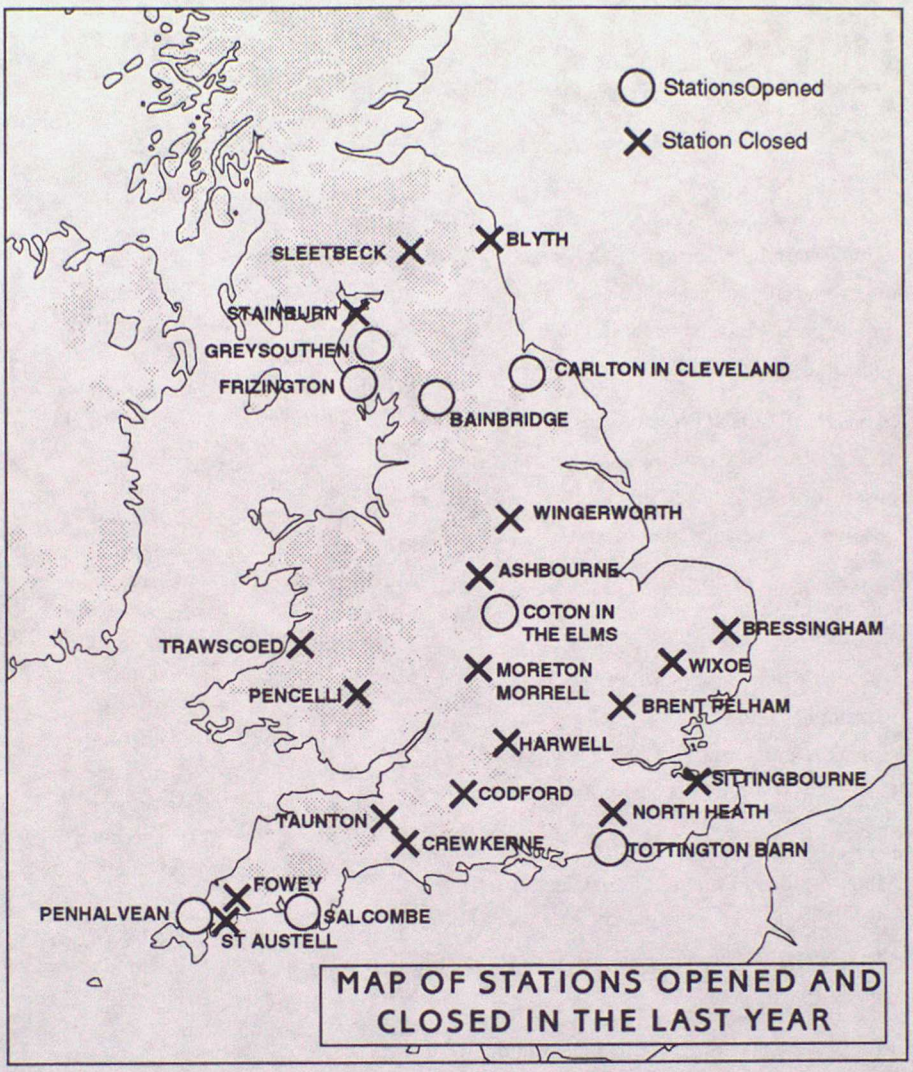
During October 1991

TOTTINGTON BARN (W. Sussex) - A YHA hostel run by Mr A Harris.

In addition, the following stations should be operational this year.

Storrington (W Sussex)
Charsfield (Suffolk).
Aughton, Ruddings (Yorks.)
Rosedale (Yorks.
Wark (Northumberland)
Coalbrookdale (Shropshire)
Penton (Cumbria)
Treknow (Cornwall)
Strete (Devon)
Heydon (Hertfordshire)
East Okement (Devon)

Several other potential sites are being investigated.



MAP OF STATIONS OPENED AND CLOSED IN THE LAST YEAR

OBSERVERS

The Senior Technician at Askham Bryan, Mr S Broomhead, retired at Christmas after observing for nearly 19 years. He will be greatly missed by us and by his colleagues at Askham Bryan.

Mrs Jean Evans at Prestatyn has retired after 30 years of producing excellent observations. It is hoped that a new observer will be appointed soon.

At Folkestone Mr P Power has retired after 20 years of observing.

Halstead's long-term observer, Mr B J Firmin, has retired from the school but still takes an interest in the Met. site. Mrs C Blackwell is now in charge of the station.

Mr F Weeden has retired from Clacton after 15 years.
Mr D Melville-Hayes is now the official meteorologist.

At Newquay the obsever, Mr J Cridland, has retired after 10 years. Mr E Heesom is now in charge.

Mr R Brown, who observed at Lathom Park for 20 years, has retired.

Mrs M Edwards has replaced Mr R Haslam at Oswestry School.

We were saddened to hear of the deaths of the Reverend N Morrison, the observer at Randwick, and Mr E Wood the observer at Ashbourne. The station at Randwick is now being run by Reverend Morrison's family and friends but, unfortunately, Ashbourne has had to be closed.

If I have missed anyone out I apologise.

Any news from your station is welcome and, if you wish, can be included in the newsletter.

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AWARDS TO OBSERVERS IN 1992

Awards will be made to the following observers for long-term observations

Mr & Mrs Payne - Astwood Bank
Mr E P Jones - Bala
Mr G Hustings - Bournemouth
Mr D Cory - Bramham
Mr A Messem - Brooms Barn
Dr P J Reynolds - Butser
Mr J Fletcher - Buxton
Mr A G Langley - Cambridge B.G.
Miss C Godfrey - Canwick
Mr G D Hoskins - Cardiff
Mr & Mrs Pizzey - Cavendish
Mrs V Powell - Cawood
Mr D Melville-Hayes - Clacton
Mr E Evans - Cwmystwyth
Mrs J B Griffiths - Cwmystwyth
Mr B V Thomas - Didbrook Fields
Mr J Adams - Eastbourne
Mr P De La Mothe - Eastbourne
Mr K Sawyer - Eastbourne
Mr T F R Gibbs - Folkestone
Mr R V Scurlock - Goggerddan
Mr J M Maddox - Hawarden Bridge
Mr J Snell - Hawkridge
Mr C G A Martin - Hayling Is.
Mr A Wakeham - Hayling Is.
Miss D Roberts - Hurley
Mr J Bowling - Kew
Mr A Carricoates - Kirton
Mr G C Steele - Kirton
Mr T Palmer - Leckford
Mr R W Parr - Llanfair Caereinion
Mr T Buckley - Macclesfield
Mrs E G Hill - Malvern
Mr S Neugebauer - March
Mr P Hill - Moel Cynedd
Mr D Hopwood - Morecambe
Miss C Rout - Moulton Park
Mrs M M Ilsley - Moulton Park
Mr D Warden - Moulton Park
Mr Colwill - Melbury
Mr Laws - North Wyke
Mr Tyson - North Wyke
Mr Grant - Porthcawl
Mrs P Preston - Preston
Mr K Robinson - Preston
Mr A Murray - Redesdale
Mrs M R O'Sullivan - Rettendon
Mr A P Hull - Rumleigh
Mr R Taylor - Ruthin
Mr D Whiteley - Sheffield
Mr D E Taylor - Slaidburn
Mr N Morgan - Sparsholt
Mrs J Thomas - Swyddffynon
Mr J E Davis - Swyddffynon
Mr G Boardman - Terrington
Mr L Kingswood - Whitechurch
Mr K Marsden - Wiseton
Mr M Lillie - Wiseton
Mr J Williams - Writtle
Mrs L Haydon - Alice Holt
Mr & Mrs Martin - Ashover
Mr E Jones - Bala
Mr R D Morris - Botwnnog
Mr D Hardy - Bramham
Mr F H C Kendall - Bude
Mr S Thurkettle - Cockle Park
Mrs A Warner - Durham
Mr R Swinhow - Durham
Mr T Benfield - Grendon Underwood
Mr M Edge - Keele
Mrs J Bannon - Loggerheads
Miss C R Winner - Loggerheads
Dr T E Rogers - Marlborough
Mr J G Hilton - Morley St Botolph
Mr P C Cunnington - Ness Gardens
Mr J Bennett - Ryde
Mr & Mrs D Duff - Sandown
Hon. J Parker - Shirburn
Mr G Salisbury - Southsea
Dr I R D Proctor - Strete
Mr D Bragg - Swanage
Mr H A Baker - Wisley
Mr D Chatwin - Caldecott
Mr J Warner - Durham
Mr K W Bryar - Falmouth
Mr P J Power - Folkestone
Mr C G Roberts - Halesowen
Mr C H White - Long Sutton
Mr R Green - Lyonshall
Mr J Bailey - Macclesfield
Mr J S Powell - Penmaen
Mr W C Hunt - Terrington St Clement

Congratulations to all of you.

Book awards were made to the 10 observers listed below for the excellent returns they provided during the year.

Mr & Mrs Payne - AstwoodBank (Worcs.)
Mr R D Morris - Botwnnog School (Gwynedd)
Mr M Cinderey - Carlton in Cleveland (Cleveland)
Mr & Mrs Pizzey - Cavendish (Suffolk)
Mr P Summers - Herne Bay (Kent)
Mr K Cook - Low Etherley (Co. Durham)
Mr A Ozanne - Minehead (Somerset)
Mr R O'Sullivan - Rettendon (Essex)
Mrs K Mills - Southport (Lancs.)
Mrs W A Hibbitt - Writtle (Essex)

Also mentioned as providing a very high standard of returns were:-

Miss L Haydon - Alice Holt Lodge
Mr M F Wickenden - East Malling
Miss D Roberts - Hurley
Mr R W Parr - LLanfair Caereinion
Mr K Robinson - Preston, Moor Park
Mr K Spiers - Reading University

The number of years to be worked in order to gain an award have been changed yet again. We now make awards at 10, 20 and 30 years. I'm trying to get an award to everyone who should have one. Have you or your deputies observed for 10 years or more without an award arriving? Please let me know. I'd hate anyone to feel left out!

WEATHER FEATURES - 1991

We were pleased to receive some interesting statistics, on the weather at their stations during 1991, from a number of observers.

ASHOVER CLIMATOLOGICAL STATION - DERBYSHIRE

Facts, figures and records for the period December 1990 to November 1991. Recorded by the observer, Howard Martin.

Averages and records based on the last 25 years.

Dec 1990

4th wettest - rainfall total 139.2mm 163% of average. Wettest 3 day Xmas period with 40.2mm of rain. Coldest 3 day Xmas period since 1986. Wettest December day since 1975 the 7th with 35.5mm resulting in a snow depth, on the morning of the 8th, of 41cm. Coldest December since 1982.

Jan 1991

Mean temperature 1°C below average - coldest since 1987. Rainfall 2% below average with only 2 days with snow lying. Highest minimum temperature 2.8°C. Coldest recorded average of 6.9°C.

Feb 1991

Coldest February since 1986 and driest since 1987. Ground snow-covered for 20 consecutive days.

Winter 90/91

Rainfall 13% above average. Temperature 0.8°C below average. Coldest winter since 1985/6.

Mar 1991

2nd warmest on record with mean temperature of 7.3°C (2.2°C above average). Mean minimum temperature equal warmest with 1990 at 4.3°C (2.6°C above average). Highest minimum since 1981 and 2nd highest on record at 9.1°C. Maximum temperature of 17.2°C on 13th, 5th warmest March day.

Apr 1991

Absolutely average. May 1991

Driest May on record only 16% of average rainfall. Spring 1991

2nd warmest spring on record. Mean of 8.5°C was 1.0°C above average. Mean minimum for spring - warmest on record at 4.9°C, 1.2°C above average. 4th driest spring with 63% of average rainfall.

Jun 1991

Coldest June since 1972 at 1.9°C below average. Mean maximum was 2.6°C below average. Lowest June maximum since 1972 was 20.2°0C on the 28th. Minimum temperature of 0.7°C on 4th equalled the coldest June night on record. Rainfall July 1990 to June 1991 12% below average.

WEATHER FEATURES - 1991 CONTINUED

Jul 1991

Mean minimum of 12.5°C only July 1983 has been warmer. Minimum of 9.5°C highest on record. Average is 6.4°C. 4th warmest July overall. 18.8mm of rain on 24th - wettest July day since 1976.

Aug 1991

Driest August since 1976 and 2nd driest on record. Total 13.4mm was 19% of average.

Summer 1991

Mean temperature 0.1°C above average. Rainfall 79% of average.

Sep 1991

Mean maximum temperature of 19.2°C highest on record and 2.5°C above average. Maximum temperature of 26.2°C on 1st was warmest September day on record. 2nd equal warmest September on record. Rainfall 66% of average of which 22.5mm, 53% of the month's total, fell on the 28th, making it the wettest September day since 3rd September 1984.

Oct 1991

Driest October since 1978 - 59.7mm - 78% of average. Nov 1991

Absolutely average. Rainfall Jan 1991 to Nov 1991 = 616.2mm - 79% of average. Average rainfall = 778.7mm.

Autumn 1991

Autumn rainfall 189.2mm - 85% of average. Autumn temperatures:-

Mean maximum 0.7°C above average. Mean minimum 0.0°C from average.

From Christine Godfrey at Canwick, Lincoln, comes the following.

Third year of drought giving an accumulated deficit of just over 1 foot (about 305mm Ed.) over the 3 years. We began to get the feeling that rain was avoiding us.

Storm of the 26th September was well documented by the local press. The total rainfall from 0900 GMT on the 26th to 0900 GMT on 27th was 50.9mm but, as the storm was localised, it is quite possible that more fell on the City Centre. The storm began about 0830 GMT and went on for approximately 2 hours. I was able to record Present Weather 97!! There was more rain later in the day. All the local emergency services were at full stretch and several lightning strikes were recorded along with many flooding incidents, due to the City being partly on a hillside.

With a monthly total of 101.5mm it was the wettest September since 1976 (which also broke a drought).

Here is a small excerpt from the weather details at Halesowen sent in by Mr C. G. Roberts.

JANUARY A frosty month, after a mild start, with 28 ground and 17 air frosts. Sunshine was above average giving the sunniest January since 1984, 4th sunniest on record. Ten days were sunless, six between the 25th and 30th. Rainfall was well above normal, much of this falling between the 1st and 18th. Almost 2 inches fell between the 7th and 11th. The month was also windy, gusts reaching 60 m.p.h. on the 5th. Coldest for 4 years.

FEBRUARY The coldest February since 1986 with mean daily temperatures down to 1.3°C. Some severe frost occurred mid-month with air temperatures down to minus 10.1°C (14°F) and to minus 17.7°C (0°F) on grass. The 3rd was the 4th coldest February day on record with an air maximum of minus 2.1°C (28°F). In contrast, the night of the 24th was the 4th warmest on record with an air minimum no lower than 8.8°C (48°F). Snow lay on 11 mornings and to a depth of 9ins, on the 10th.

WINTER 1991 Overall the 6th most severe since 1956. Rainfall was marginally down, though days of snow and sleet were up at 25 against the usual 15. Frost occurred in the air on 49 days (normal 33) and on the ground on 76 days (normal 49). Sunshine was marginally up at 177 hours against the usual 154 hours, with 33 sunless days as opposed to the usual 37. Exceptional events were the thunderstorm on Christmas day and the gales of February with gusts to 50 knots.

MARCH A variable month with both cold nights and warm days. Maxima were 2°C above the 30-year norms with a high of 18.9°C (66°F) on the 13th. The month began cold with a night minimum of minus 1.8°C (29°F) on the 2nd when the grass fell to minus 7°C (19°F). Sunshine was well down at 76 hours, with
9 sunless days. Between the 14th and 20th only 8 hours of sun was recorded.

APRIL A wet month with almost a quarter as much rain again as usual. April 29th was the wettest day with 30.4 mm (1.20 in) or 40% of the month's total. It was the wettest day since 22 August 1987 and the 2nd wettest April day on record. In terms of duration, April 29th was the wettest on record with 24 hours continuous rain. Air frost was 43% up on usual. The sunshine total was a mere 70% of that recorded in April 1990. It was the windiest April in a decade with gale force gusts on 3 days.

MAY May was the driest on record in Halesowen with only
12 mm (0.45 in), bettering the record set last year. Rain fell on only 7 days almost 38% of the entire total falling on the 15th. Ground frosts numbered 5, almost twice expectation, though mean daily temperatures were within 0.1°C of the thirty year means. Temperatures on the 4th only reached 9.5°C (49°F) giving the coldest May day since 18 May 1987. May was also dull with
only 77% of the expected sunshine, the 5 sunless days being twice the norm.

SPRING 1991 Spring was the 6th warmest since records began with a mean daily temperature of 8.9°C (48°F). It

was the 11th driest spring on record with a total of 146.6 mm (5.75 ins). The season was less sunny than usual with 18 sunless days against the norm of 13.7.

JUNE A depressing start to the Summer, the month being colder, wetter and less sunny than usual. The highest maximum of 21.7°C (71°F) on the 30th was the lowest June maximum since 30th June 1972 and the 2nd lowest on record. The air frost on the 2nd was only the 3rd such occurrence in 35 years of data, the month being the coldest in general for 19 years. It was also the 8th dullest June on record with a total of only 78% of the normal sunshine. Rain fell on 22 days making it the wettest since 1987 which had
25 rain days.

JULY Not untypical of an English summer month. Rainfall was almost double expectation at 99.3 mm (3.91ins) giving the 8th wettest July since 1946. The fall of 36.5mm
(1.44 ins) on the 30th gave the wettest July day on record, beating the previous of 34.6mm (1.36 ins) set on 10 July 1968. Temperatures were above normal by as much as 2°C in the air with the highest maximum 28.6°C (83°F) on the 29th. Just 5 days were hot (max more than 25°C (77°F)) against the record 20 hot days of 1983. Sunshine was 16 hours above expectation, though well below the record levels of 1990, 1989 and 1976.

AUGUST The driest in 35 years with only 26 mm (1.02 ins) of rain contrasting with the 142mm (5.59 ins) of 1962 and 186 mm (7.22 ins) of 1946. Temperatures held up well, some 2°C above normal in the air. Sunshine was 43 hours above the 30-year norm at 211 hours but was well below the record levels of both 1989 and 1990.

SUMMER 1991 Somewhat below the average of the last 30 years in general conditions. Rainfall totalled 188 mm (7.4 ins). Air temperatures were above average, the mean daily of 15.5°C being 0.3°C above the 30 year mean. Rain fell on 46 days, 16% above average, though thunderstorms, numbering 2, were 34% of expectation. There were 2 ground and 1 air frost.

SEPTEMBER Warm, dry and sunny, in general, being the 2nd sunniest on record with 180.9 hours and only 2 sunless days. Temperatures held up well until the final 5 days. The maximum of 27°C (81°F) was recorded on the 1st and 4 days were hot giving the warmest September since 1959. The mean 100 cm soil temperature of 15.7°C set a new record for the area. Rainfall was about average, almost the entire total falling over the final 3 days. The heavy fall of 39.1 mm (1.54 ins) on the 28th gave the 4th wettest September day on record.

OCTOBER A very variable month, warm and sunny to start but ending dull and wet. Rainfall was down on expectations at 51.3 mm (2.01 ins) though the 17 rain days were above the 30-year norms. The mean daily of 9.8°C (50°F) was below average for the month. Sunshine was also below average, the 9 sunless days being the worst since 1982 and the 8th worst in the last 35 years.

AUTUMN 1991 The Autumn maximum of 27°C (81°F) on 1 September was the second warmest autumn day on record, behind that of 27.2°C (81°F) set on 30 September 1961. Rainfall was below the seasonal average by 28.1 mm (1.11 ins). Sunshine was above average by 22.1 hours, although the 24 days with no sun at all was 4 above normal.

NOVEMBER A dull and dreary month with more rain days, but less rain, than normal. The rate of 6 ins per hour for a time on the 1st, was the heaviest on record here. Sunshine was down on usual, with 13 sunless days. Temperatures were above average, though ground frost was 25% above the 30-year norm for the month.

DECEMBER A cold and foggy start, but a mild and windy end. Maximum pressure of 1042.7 mb on 25th was the highest December reading since December 9th 1970, the monthly mean of 1026.5 mb setting a new record. The maximum temperature of 13.5°C on the 22nd was the highest since 1985 with the low of minus 8.2°C on the 12th being the lowest since 1985. Rainfall at 10.1 mm set a new low record for December, the 7 rain and 3 wet days also being new low records. Sunshine was down at 33.4 hours, the 17 sunless days being the worst since 1989 and the 4th worst on record. Fog was noted on 5 days, 2 of these freezing.
Six days with gale force gusts, the worst to 51 knots on the 23rd.

THE YEAR The mean daily temperature of 9.3°C was within 0.1°C of the 30-year mean. Rainfall was only 83% of the usual amount. Sunshine was marginally down on the 30 year mean.
81 days in the year were totally sunless, 21 more than in 1990.

A FEW THOUGHTS FROM CLIMATOLOGICAL STATION MANAGEMENT

By the time this newsletter is circulated I will have been in my present post for more than two years. My colleague, Shirley Charge, has asked you to provide articles of interest so I thought it was only fair that I attempted to write one from this side of the fence. A good idea at the time, but not so easy when you sit down and try to put a few thoughts on paper (or word processor). I arrived in this Branch in January 1990, after five years in the Personnel Management Branch. I never had any contact with the Climat Network during my previous twenty-three years in the Met Office, but I did have observing experience between 1972 and 1985 which has stood me in good stead in this job.

As most of you will be aware, there are some 325 climat stations in England and Wales and it is the task of this section to look after the administration and inspection of the network. This is undertaken by Shirley and myself, and though we are answerable to our superiors we do have the responsibility of ensuring the smooth running of the network. The administration covers a multitude of tasks but basically it means making sure you have all the equipment needed to record the weather data and the stationery necessary to pass it on to our Quality Control section. The courses for co- operating observers, held at the Met. Office College at Shinfield Park, are also co-ordinated from here. It may not sound a great deal of work but I can assure you that it keeps us quite busy. Several of the administration practices have been changed in the last year; most of these should be transparent to you but should hopefully lead to a better service.

Before I arrived, the section was run by Elwyn Edwards and Dick Brooks. Dick's main function was looking after the admin and undertaking a few inspections, while Elwyn carried out the majority of the inspections and prepared the inspection programme. I took over from Elwyn and very quickly lost Dick to another Branch, on promotion. Phil Doherty joined me from Northern Ireland but only for four months or so. Phil went home every weekend which precluded him from carrying out any weekly tours of inspection. This meant I was out on the road for ten weeks during 1990 and as a consequence did not have much time to devote to the admin side. Shirley arrived as my permanent colleague in September 1990, too late for the inspection season but soon to come to grips with the admin. Unfortunately she was off sick for several weeks before Christmas so it was early 1991 before we put our heads together and started to change some of the old practices. We decided that there should be no iron curtain or demarcation lines between us and that we should become interchangeable. The main outcome is that Shirley does more inspections than her predecessors and I have become more involved on the admin side.

You will probably remember that the annual distribution of forms and stationery from APFS (Woolwich) turned out to be a shambles in October 1990. Until that time we had to inform APFS of changes, closures, or new stations through another Met Office Branch. Their master disc was overwritten and there was no back-up, hence the erratic distribution. That has changed, and we now deal directly with APFS. This involved a massive amount of work because all the station details and requirements had to be put on disc (with a back-up). Although I did my share of typing I take my hat off to Shirley who stuck with the task and did the bulk of the work. Although it is difficult to have a foolproof system, our reward has been a fairly smooth distribution in October 1991. Also we have struck up a good working relationship with APFS staff at Woolwich and Llangennech which is all to the good. I think that is the biggest admin change and the one that, hopefully, you have had the most benefit from.

Since the Met. Office became an Agency in 1990 it has become more difficult for our colleagues in the outfield to carry out the same number of inspections that they have in the past. As a result, it was agreed that we would undertake more from this Branch and in 1991 Shirley and I were out for seven weeks each, visiting some 74 stations. Admittedly some of these were professional Met. Offices but along with the 50-odd stations I visited in 1990 I really feel that I am coming to know the network. I am in the process of drawing up the inspection programme for 1992 and we hope to be on the road for seven weeks each and to see a further 75 stations or so. One change to the the programme that has taken place this winter is the length of time between inspections. Up to now met. offices, Health Resorts and Agro-Met stations have been visited every two years and basic climatological stations every three years. It has been agreed that all stations will now be visited every three years, the only exceptions being WMO Reference Stations which will continue to be inspected annually.

As you probably realise, the inspection of your station is an important part of the network operation. It ensures that stations are functioning and being maintained to standards acceptable to the Met. Office. It also allows us to meet you and, hopefully, sort out any problems that you may have. Although it can be socially disruptive being away from home (my wife complains about having to cut the grass and watering the vegetable patch), it does have its rewards. In two inspection seasons I have had the chance to visit, in England, such far-flung stations as Cockle Park (near Morpeth) in the north east, Grizedale (near Ambleside) in the north west, Tregastick (near Looe) in the south west and Elmstone (near Canterbury) in the south east. In Wales I have been to Dale Fort in the South and to Aber in the

North with a good representation in between. Being a Scotsman it would be good to visit some of the Scottish stations as well but unfortunately they are looked after by our office in Edinburgh. Never mind, my present post has allowed me to visit parts of England and Wales that I had never visited before and it does bring it home that we do live in a green and pleasant land (motorways and city centres excepted).

We have a varying range of stations including those run by local authorities, agricultural colleges, water authorities, universities, schools, farms and private individuals. If I have left anybody out please accept my apologies. Despite the wide range of stations the standard is generally very good. Oh yes there are some stations that fall below the mark but I am too discreet to mention them here. Basically what we do at an inspection is check all your equipment and the exposure of the site, write out a report which we retain on file here and send your authority a post-inspection letter with any recommendations that will bring the station up to standard. The main faults that we find are: screens that are dirty or need painting, wet-bulb muslins that are not changed frequently enough and rain-gauges that have become loose in the ground. We try to correct faults during the inspection and give guidance as required. We do, however, rely on your co-operation to keep your equipment up to standard. The majority of our visits are arranged to take place in the morning, near to observation time. We realise many of you have tasks to perform, other than weather recording, so being on site when you make your readings affords us the opportunity to meet and discuss the station and any problems with you. It never fails to amaze me the enthusiasm most of you have for the weather, and this contributes to the high standard of data recorded for the network. It also makes my job so much more enjoyable, though I must admit that some of the questions asked of the 'experts' can take some research before answering satisfactorily.

We also try to see any autographic charts, sunshine cards, pocket registers and copies of Metform 3208B that you retain. This can help us to pick up faults in equipment. The 3208B is of course the link between what you record and what goes into the climatological database and as such is a vitally important document. You will probably all be aware that it is quality controlled before it is keyed into the database and no doubt most of you have had a letter from one of my colleagues, from that section, suggesting changes to your data. To err is human and many of the errors are minor or transcription. One of the main mistakes is observers not throwing back the maximum temperature and rainfall measured to the previous day. Also maximum and minimum temperatures should always be higher and lower, respectively, than the previous and current day's dry- bulb temperatures. A temperature gauge for use with the 3208B will hopefully be available soon and should eliminate most of this type of error. Shirley will elaborate more about this elsewhere in the newsletter.We do find, when we are out on our trips, that some of you are aggrieved at the letters you receive from Quality Control. The most common complaint is "Bracknell change our values by +/- 0.1°C, that is just nit picking". Your views have been passed on and it has been agreed that changes will be made to the amendment letter procedure, giving more leeway to you, the observer. Your data will still be scrutinized and obvious errors 'corrected'. The other main area of grievance is when one of your recordings is changed by several degrees, millimetres, or hours depending on the element observed. "How can Bracknell change my value, they were not here and do not know the topography of the area?" is the usual cry. I have sympathy with you and although the computer check does take topography into account it can still over- or under-estimate. I do not intend to go into all the checks your data undergo; this has been covered in previous newsletters. What I will say is that the letters from my colleagues are only suggested amendments. If they do not hear from you they assume that you are happy with the suggestion and they will use the amended value. If you feel strongly enough that the amendment is wrong and your original value is correct then please contact Quality Control. Unless there is a very good reason they will accept your reading.

At 325 stations, the network is by no means complete and we are always on the lookout for new ones, especially in data- sparse areas. Unfortunately, existing stations close down for various reasons and we always try to replace them. This forms another important part of our work in the section and in this we receive a great deal of initial help from Jan Lewandowski, who many of you will know works in Quality Control. Jan has a plethora of contacts and at times we become snowed under with volunteers. Briefly the procedure, following an offer of co- operation is as follows. Firstly we confirm that the offer is from an area where we need data and from someone who is also offering a long-term commitment (at least ten years). If that is indeed the case we proceed to a site visit to assess suitability. Assuming it passes that stage the final report is put together and goes to the Head of our section, Mike Weston for final approval. If this is granted we can go ahead and open the station but as many of you know the whole operation can take a fair period of time. The end result, however, should be a good station that will be an asset to the network.

Well that is a small insight into the part that Shirley and I play within the Climatological Network. Without you, however, there would be no network, and Shirley and I would like to thank all of you for the dedicated and important job you are doing as co-operating observers. We look forward to meeting many more of you during the coming year and having the chance to see parts of the country hitherto unseen. In the meantime we are here to help you and if you have any queries please do not hesitate to contact us. Even during the inspection season we will endeavour to have one of us manning the phones.

George Spence
Climatological Station Management
January 1992

HISTORY OF METEOROLOGICAL RECORDS AT ROTHAMSTED EXPERIMENTAL STATION

ROTHAMSTED Experimetal Station was founded by Sir John Bennet Lawes in 1843 and is the oldest agricultural station in the world. Some of his early experiments are still continuing, providing information about growing crops on the same land for nearly 150 years.

He became interested in the effects of the weather on the crops at an early stage and set up a system for measuring various meteorological parameters.

5-inch rain-gauge

A 5 inch gauge was used in the garden of one of the estate houses, near the laboratory, from about 1852 until about 1880. The water collected was carried across to the laboratory and the volume measured in a graduated cylinder. The gauge was then moved to the meteorological enclosure. In addition, about 1900, an 8 inch gauge was installed and used until 1947.

In 1948, upon Meteorological Office recommendations, a 5 inch gauge, 12 in. high, was placed inside a 5 ft radius turf wall, also 12 inches high.

1/1000 acre rain-gauge

During the winter of 1852/3 a rain-gauge was constructed in one of the arable fields to provide sufficient rainfall to allow for its chemical analysis. The gauge was rectangular, measuring 7 ft 3.12 ins by 6 ft, to give an area of 1/1000 acre, and consisted of a wooden collecting funnel lined with lead. The water was collected in glass carboys which were measured twice a day when necessary. The gauge was in use from February 1853 to November 1876. The only change was in August 1873 when the carboys were replaced by galvanized iron cylinders fitted with gauge-tubes so the quantity of water could be measured directly.

This gauge was replaced by another of identical size but with a plate-glass bevel on top of the lead, this made the top about 1 ft above the level of the surrounding soil. The new gauge was erected in the immediate neighbourhood of the old gauge and had galvanized iron cylinders which could hold over half an inch of rain. When one was full the water overflowed into another side. Measurement was by a graduated gauge-tube to an accuracy of 1/1000 inch. The new gauge started in use in July 1873 and has continued until the present day, the rain water is measured, collected daily and sent for chemical analysis. In August 1976 some of the hardwood support timbers were replaced. More of the woodwork now needs replacing and at the same time a new lead-lined funnel needs to be fitted.

The reason for moving the gauge was to site it nearer the then newly built drain-gauges.

The drain-gauges

Three drain-gauges were constructed in summer 1870, these have a surface area of 1/1000 acre to complement the raingauge. The drain-gauges have different depths of 20 in, 40 in and 60 in. The intention was to have natural undisturbed soil, so, to construct the drain-gauges, a trench was dug in front and cast iron perforated plates introduced. This bottom was then strengthened with transverse girders and the plates and girders were supported by brick laid in cement on three sides of the intended gauge.

One by one the remaining sides had a trench dug by the side and walls of brick were laid. The brick was built to 3 in above soil level and the top made to slope outwards. The trenches were then filled in with brick to allow access by ladder to measure the drainage water.

About 1 ft 6 in below the perforated plates a large zinc funnel, of the same area as the soil above, was fixed. Drainage water percolates through the soil, falls onto the funnel then collects in vessels. During the first three years the vessels were carboys which were then weighed, but since December 1873 galvanized iron cylnders fitted with gauge tubes have been used as in the large rain gauge.

The soil is hand weeded to keep the area clean. The gauges have been in constant use, the drainage water is measured, collected daily and goes for chemical analysis.

Natural syphon rain-gauge

In 1921 a Negretti & Zambra natural-syphon rain-gauge was installed to give times and intensities of rainfall. This was changed to metric in 1971, the present Casella instrument has a diameter of 203.2 mm (8 inches) and was bought and installed in 1978.

Hours of sunshine

The measurement of hours of bright sunshine started in 1892 using a Campbell-Stokes sunshine recorder which produces a brown scorch mark on a card which is then measured.

Solar radiation

Solar radiation has been measured daily since October 1921, apart from instrument repairs. Initially a Callendar recorder was used, this was owned by the Plant Physiology Department of Imperial College, Rothamsted was asked to take over the instrument in 1948. In 1955 a Moll-type solarimeter (Kipp) was installed. The daily totals were obtained by planimeter integration until 1958 when an automatic integrator was added. A Kipp & Zonen integrator was bought and installed in 1989.

Temperature

Air temperature was first measured in 1878. Until 1970 temperatures were measured in °F, from 1 January 1971 the air temperatures were changed to °C and by 1 January 1972 all temperatures were read in °C. The temperatures of dry bulb, wet bulb, maximum, minimum, grass minimum, along with 10, 20,30, 50 and 100 cm under grass and 10,20 and 30 cm under bare soil are all read daily.

Wind

A note of wind direction and force was made once a day using the Beaufort scale. In 1944 a cup anemometer was installed 2 m above ground and the run of wind recorded in miles per day. This was changed to kilometres per day in 1975.

In 1954 a Dines anemometer was installed at the meteorological enclosure with sensors 45 ft above ground. A Munro anemograph was installed in 1978 to give a continuous readout of speed and direction.

Evaporation

A standard British Meteorological Office evaporation tank was installed in 1947. It is 6 ft square, 2 ft deep and of

galvanized iron set in the ground with the rim projecting 3 inches above ground level. The level is read daily with a hook gauge and topped up or drained as necessary.

Other observations

Amount of cloud has been recorded daily from 1935, state of ground and visibility since 1959.

At present we have four meteorological observers on a rota. Each day 33 elements are recorded and once a week the barograph (made by Negretti & Zambra and started in 1925) and air thermograph (made by Casella and started in 1950) charts are changed. The data is entered on Metform 3208B and the data is also entered on a PC using dBase III plus program. From 1983 a sub-set of 11 records have been put onto the Rothamsted main frame computer daily to allow experimenters easy access to some of the more commonly used measurements.

At Rothamsted we have data from one of the longest continuous runs of meteorological data in the world.

Dave Yeoman, John Croft,
Bob Norrish, Helen Stevenson.

LIFE AT ARTHOG

It is 3.30 p.m. on Tuesday 12th November 1991. The Met. Office Summer Newsletter from Shirley Charge arrived this morning. Shirley asks for articles from the stations and I am sure she is thinking of something highbrow like averages or aberrations in weather patterns, neither of which are within my scope (I'm not highbrow either, Ed.). But I would be interested to hear about other climate stations and their minders and thus I am giving a brief account of ours — where it is situated and how it fits into our lives — and I hope this will start the ball rolling.

At the moment I am standing by the patio doors in our living room, looking out at what is normally one of the lovliest views in Britain. Today it is a stormy grey scene with tempestuous blasts of rain driven by howling untamed winds. A brief gasp of brilliant light followed immediately by an immense crash of thunder— and the cats run in a feline stream to hide behind the settee. I very nearly join them. The gale wuthers in the chimney and the fire flames as the turmoil rages over the farm. It shakes the house and, as the rain momentarily lessens, I can see debris flying high into the air.

We inherited our weather station from a neighbour who set it up and then moved house. Our home is a small sheep farm on the west coast of Wales where the rugged Cader range of mountains drop away to the Irish Sea. In fact we used to be an island on the south side of the Mawddach estuary but over the centuries the estuary silted and we are now a wooded bank rising above an ancient peat bog which lies between us and the outside world. On the seaward side of the 'island', we have nearly half a mile of private beach with rocky cliffs and sea pools leading to acres of sand with shallow lagoons at low tide. On the leeward side we have mudflats and reed beds which house and feed an interesting selection of birds and beasties and on which I waste an inordinate amount of time instead of doing mundane household jobs like ironing. The peat bog, to the south of the house, is listed as a site of special scientific interest and, here too, I waste a lot of time looking for unusual bits and pieces when I should be doing something else.

The screen is situated about 50 yards from the water on the leeward side of the 'island', where it falls away to peat bog. Somebody from the Met. Office once told me that we have a microclimate since we are in the mouth of the estuary surrounded by high mountains. I don't know what it means but I confidently trot the phrase out to our holidaymakers who invariably seem impressed. We certainly seem to be milder and dryer than inland but this is based on my personal observations on journeys to and from Dolgellau, our nearest town, some six miles away at the head of the estuary, and not on any scientific readings that I am aware of.

Himself of the Household, observer number one, does a mean line in sheep farming plus building electronic gadgetry for the machine- tool industry and sundry other toils such as repairing the hen house roof, building us a new house and maintaining our two static caravans which are let to the holiday trade. I do a mean line in accountancy, tax work, letting the two static caravans, finding problems with the sheep, finding things that need to be done on the farm, carrying out voluntary work and being a general nosey parker.

What do other observers do apart from minding their stations? So often as I clutch up the Pocket Register and walk down to the screen, I think of all the other observers who are clutching up their books and advancing on their stations. Do they rush back from their readings to deliver a lamb, to fill up an Agricultural Census form, to placate a client who has not yet received the tax refund promised for three weeks ago, to make six pounds of marmalade, to mug up a technicality from the latest Finance Act or to make a complicated addition to the latest bit of gear for the machine tool- industry. Do THEY have umpteen visitors who want copies of the readings, or an explanation of all the instruments, or to know why we have a strange-looking beehive?

I find that being observant to the weather has made me more aware of other natural features too — and how different — and often beautiful, they are. The red sunrise on a cold January morning will turn the mountains from burnt toast to orange gloss — the black-velvet forests to apple-green chiffon and the sea from slate to sapphire. Some people have time to notice these things anyway but my life is conducted in something of a bustle and I don't think I would often notice the visibility or the natural quality of the day, were it not for the readings and the weather diary.

Incidentally the wind has dropped to a restless stillness. A wondrous pearly silver sunlight lights up the estuary and the nearby mountains — turning dead bracken to shining copper — and the cats have emerged from behind the settee.

The other half of our observation team comes indoors, windblown and soaking wet. 'The sea is surging - the tide has hardly dropped at all'. 'It's just as well the tides are neap!'. 'Could I have a cup of tea?' Or — (hopeful voice) 'Is it too early for a scotch?'

Sally White, Arthog Station 7805 (Fegla Fach Farm, Arthog, Gwynedd LL39 1BZ)

CITIZEN WEATHER OBSERVERS

WE ARE NOT ALONE!

The following article is taken from the American magazine "Weatherwise", October 1990, published by Heldref Publicationsand produced here with their kind permission. The Author, Bud Littin, is the public affairs officer for the National Weather Service in the USA. It is obvious that the co-operating observers are as esteemed in the USA as they are here. We have a more centralized approach because our network is rather smaller in area and the stations are more densly packed. I hope you agree that this allows us to have more personal contact with all of you rather than the more parochial set up in the USA. (Ed.)

Kathleen Ourada and her husband, Earl, live on a farm near Boise, Idaho. They've been married 33 years and have been observing and reporting the weather all that time - while raising hay, grain, cows, turkeys, chickens, and ten children!

"In those 33 years I bet I can count on one hand the number of nights we did not take the weather. That's almost as important as saying your prayers," she exclaims.

Brother Felix and Brother Jonathan would agree. Monks at St. Leo's Abbey in Pasco, Florida, they take turns watching the weather, and at 5:15 p.m. each day, record the maximum, minimum, and current temperatures, as well as cloud cover and precipitation amounts.

The two brothers are the latest in a line of monks at St. Leo's who have been operating a volunteer weather station for the federal government for 100 years now. Brother Felix is the Abbey's gardener, so watching the weather fits right in with keeping the flower and vegetable gardens.

Retired postal worker Ralph Noyes of Corinne, Utah, operates the oldest volunteer weather station in his state. It was started by the Army Signal Service back in 1869. The Army needed climate data to run the newly completed transcontinental railroad and to move its troops, he explains.

The Ouradas, the monks of St Leo's, and Ralph Noyes are part of a proud corps of more than 12,000 citizen volunteers in all 50 states, Puerto Rico, the Virgin Islands, and the Pacific Islands who take weather observations for the government. Beginning this month, the spotlight will be on these dedicated men and women as they share in the centennial celebration of the U.S. civilian weather service, which dates from 1 October 1890, when Congress voted to create a civilian "Weather Bureau" by transferring the Army Signal Corps' weather service (created in 1870) to the Department of Agriculture.

The National Weather Service, now an agency of the Commerce Department's National Oceanic and Atmospheric Administration (NOAA), is joining with the departments of Agriculture, Defense and Interior, as well as many other federal and state agencies, in this yearlong celebration of America's weather services - past, present, and future.

The nation's volunteer weather observers, especially those at stations operated continuously for 100 years or more, will be the major focus of this national recognition program.

While many neighbours and businessmen find the daily and longterm weather records of the volunteer observers useful, the greatest value of their continually accumulating weather information for thousand of points across the nation is in documenting the climate of the United States.

Satellites, high speed computers, mathematical models, and other marvelous technological and technical developments notwithstanding, without the century and more of accurate observations taken by these dedicated observers, we could not even begin to adequately describe the climate of our country.

The records of these citizen volunteers also provide an important benchmark for the international study of global climate change, such as the greenhouse effect.

A Jeffersonian Tradition

The proud tradition of this army of citizen weather observers can be traced back to Thomas Jefferson, who set an example for what is today known as the "Cooperative Weather Service".

Jefferson - credited as the first American weather observer to use scientific weather instruments - bought his first thermometer while writing the Declaration of Independence and his first barometer a few days after the document was signed. He had begun making regular weather observations in 1772, and, with the president of William and Mary College in Williamsburg, later took the first-known simultaneous weather observations in America.

Like George Washington, Jefferson took weather observations well into his final illness. The last entry in his Weather Memorandum Book was made on 29 June 1826, just five days before he died. If he were alive today, Jefferson would surely be proud that thousands of Americans are following in his footsteps to record the climate of the United States. Today's citizen observers are sponsored mainly by the National Weather Service, the Army Corps of Engineers, and the Departments of Agriculture, the Interior, and Transportation. Their cooperative stations are spaced at 25 mile intervals to provide uniform, closely spaced coverage. The Weather Service and other federal agencies provide the instruments and training for the observers.

The routine at St. Leo's Abbey is similar to that at most of the 11,000 volunteer stations. After recording their observations, the monks phone their daily readings to a designated Weather Service office - in this case, the one in Melbourne, Florida, near the Kennedy Space Center. Then on the first of every month, their accumulated observations are sent to NOAA's National Climatic Data Center in Ashville, North Carolina. There they become part of a climate data base dating back to the 18th century. This national heritage helps us describe, understand, and cope with our everchanging environment - just as Jefferson foresaw.

It's in the Family

Henrietta Brandt of Walhalla, South Carolina, a retired high school music teacher, has been running her family's weather station since 1950. Her father, HW Brandt, operated it from 1916 until his death. She takes three

observations a day and also serves as a severe storm spotter for the National Weather Service.

Henrietta has won both the Thomas Jefferson Award and the John Campanius Holmes Award (named after a Lutheran minister who in 1644 took the first recorded systematic weather observations in North America) for her outstanding contributions - the highest recognition given by the Weather Service. When asked to comment on her achievments, she replied, "My father was a farmer, a hard working, honest provider for his family, a faithful church member - a wonderful all round person. At his passing I was asked to take on his work. On 1 June 1990, I completed my 40th year, and I am proud to be about my father's business".

Walter Loughlin, Jr is a sixth grade science teacher in Hunterdon, New Jersey. His wife helps him take the temperature and precipitation readings. Besides their daily reports, Walter also phones the Philadelphia Weather Service office whenever a major storm strikes, giving them the dimensions of the storm, as well as reporting thunder, lightning, snowfall, and other storm conditions.

Like thousands of his fellow observers across the nation, Walter keeps the local newspaper and radio stations up on weather events. He also shares his weather experiences with his students.

Phil Eliason and his wife, Bev, have operated a volunteer station at their home in Delta, Utah, for over 30 years. "Weather information is critical to grain production," he says. "people get anxious about freezing. They can save a crop with temperatures as low as 2 - 4 degrees (F) by keeping it wet," Phil explains.

Some volunteer weather stations have been operated by the same families for 100 years or more. The station at Forestbury, South Dakota, for example, operated since 1971 by **Raymond M Judy,** a retired telephone company manager, has been in his family since 1890. His grandfather started the station and took observations until 1909, when Raymond's father took over. His wife and son-in-law help Raymond run the station.

Jerome Stoffel of Farmington, Minnesota, is part of a family tradition of weather observing that dates back to 1888. A retiree of the Unisys Corporation, Jerome took over the station in Novemebr 1985. His wife and daughter fill in for him when he must be away. Originally , the observations were taken by his father-in-law's grandfather, of the Jerome Akin family.

This fall, the Stoffel family, as well as 14 other Minnesota families who operate century-old volunteer weather stations, gathered at old Fort Snelling on the outskirts of Minneapolis for a Weather Service sponsored ceremony honouring all the state's cooperative observers. Governor Rudy Perpich, prominent state and local business leaders, and Minnesota senators and congressmen joined in the tribute.

Paul Revere Rings the Bell

Bisbee, Arizona, a city of 8,000, is situated in a canyon and prone to flash floods. **Lynn Anderson**, retired owner of cable-TV station KVXL, is the town's volunteer observer. Besides providing the Weather Service with daily temperature and precipitation readings, Lynn has become Bisbee's "Paul Revere" when flash floods threaten.

Anderson has studied these severe weather events. When one appears imminent, he checks his sources, including the Weather Service office in Tuscon, then rings a bell atop the city's police station. Oh, yes: he also makes an announcement on KVXL.

Anderson is only one of many media people active in the volunteer observer program. Indeed more than 200 local radio and TV stations and daily newspapers in 36 states run co-op weather stations.

Frank Luepke, general manager of radio station KIWA in Sheldon, Iowa, is the observer at a station whose records go back to 1890.

"When our station went on the air in 1962, Ross Forward, who for 60 years was the Sheldon volunteer observer, began calling us every day with weather information. His official observation time was at 7 pm, but each morning just before 8 am he would call us with the nighttime lows, rainfall, etc. He was so faithful that if he did not call between 7:58 and 8:02, we would get concerned and check up on him. In the latter years of his life he was in ill health, and I would fill in for him. When I would stop at his hospital room to visit, he would quiz me on wind direction and other things. At first I thought it was just his interest in weather, but later I realised he was checking up on me to make sure I was taking the observations properly. I am extremely pleased to be the current Sheldon observer. My proudest possession is the set of record books dating back to 1890, passed along to me by Mr Forward."

The cooperative weather station at Milledgeville, Georgia, now operated jointly by radio stations WMVG and WKZR, is nearly 150 years old! It was started in 1843. Under the direction of General Manager Dale Van Cantfort, announcer Randy Beasley takes daily 7 am readings. The Milledgeville area has a history of flooding, and whenever there is more than one inch of rain in 24 hours, Randy phones the Weather Service's Macon office. There are many rivers, manmade lakes, and dams in the area. Dam operators call for rainfall information because they need to know when and how many flood gates to open when heavy rain occurs.

Fortune 500 Weather

Something like 30 percent of the stations are operated by corporations - who must find that good weather information has a positive impact on profitability. Many of the names are right out of the Fortune 500 list - Ford Motor Company, General Motors, Caterpillar, Socal, Du Pont, Arco, and Kennecott Minerals, to name a very few. There are also hundreds of local industrial and agribusiness firms in the network.

Hundreds of stations are also operated by energy companies - gas and electric utilities, pipeline operators, and oil and gas exploration and refining companies. The Connecticut Light and Power Company, for example, received a special Weather Service award in 1989 for 100 years of service by the volunteer station at its Falls Village hydro-electric plant.

Many stations are sponsored by colleges, often in support of weather sensitive agriculture research stations but also in connection with science programmes.

Tom Kenyon, volunteer observer at Hanover, New Hampshire, and administrator of the physics and astronomy department at Dartmouth

College, stirs the career interests of his students by involving them in his station's operation. Selected students earn their lunch money ($5 per day) by taking weather readings.

Dartmouth's weather station was started by Professor Ebenezer Adams way back in 1834, 36 years before Congress assigned national responsibility for weather observing to the Army Signal Service.

In the winter the New Hampshire Fish and Game Department calls the school for temperature and total snow depth to correlate with changes in wildlife habits. Other callers include zoning and planning people, law courts seeking to establish driving conditions on a certain day, and local road maintenance managers seeking help in deciding what kinds of people and equipment to deploy.

"The Dartmouth campus is a good location for representative weather readings because it is away from the heat of Hanover's buildings," Kenyon observes.

Cooperative weather stations are also found at retirement homes, resorts, hospitals, Indian reservations, state and federal prisons, and border stations of both the US Customs and Immigration Services. Many are operated by fire departments and state and local police departments. Hundreds of municipal organisations - museums, zoos, and aquaria among others - are also participants. Even the Miami Beach Life Guard Patrol is part of the network.

Water Watchers

The volunteers' observations also make major contributions to the science of hydrology - where a lot of the action will be in the 21st century, as we grapple with the growing problem of conserving our shrinking freshwater resources.The observers work with federal and state hydrologists, the Corps of Engineers, Interior Department agencies, and private industry, supplying snow, rainfall, and drought information to help gauge the health of our inland water supplies.

Many of these citizen volunteers do much more than concern themselves with the day-to-day effects of precipitation or drought on America's thousands of rivers, creeks, dams, and reservoirs. They are also current or former employees of the Corps of Engineers, the Park Service, the Forest service, and other water concerned government agencies. As such, they are often directly involved in responding to the effects of water related weather events on people's lives.

One of many examples is volunteer observer Alan Hale of Kewanna, Indiana. An Interior Department retiree, he is also civil defense director for Pulaski County. Hale is an expert on local river conditions and watches the Tippecanoe River in cooperation with Al Sipe, the state hydrologist, and the Corps of Engineers.

With help from the Weather Service, he has installed gauges at five bridges along the Tippecanoe. The river has flooded 11 times in the last 10 years. Normal level is 4 to 6 feet, but last spring, when it flooded 3 times, it reached a level of 12.5 feet.

After checking with the state hydrologist and others, Hale tries to warn people along the river three days in advance of flood stage, even though local levels can be changed by weather conditions 75 miles away. If residents are not at home, he leaves notes on the doors. When urgent flood warnings must be issued, he can count on the help of local broadcasters.

Weather Service 2000

The National Weather Service, in cooperation with the Departments of Commerce, Defense, and Transportation, is in the midst of an ambitious program to modernise and restructure the nation's weather system for the 21st century. When it is completed late in this decade, this $2 billion, "cellar to attic" rebuilding effort will greatly improve weather services to public safety and national economic decision making.

Tomorrow's weather service will rely not so much on new technology as on highly trained professional meteorologists who know how to interpret weather data most effectively. And one of the critical data streams those professionals will need will be the observations of the thousands of dedicated volunteer citizen weather observers. Their contributions in the next century will be even more invaluable to the nation and their fellow citizens than they have been for the last 100 years and more.

Summary of the weather from November 1990 to December 1991

November 1990

After a quiet beginning to the month the weather was unsettled between the 9th and 27th, with some rain, hail, thunder and even snow in places, before becoming more settled over the last three days. Thunder was reported along the south coast on the 1st, in the Glasgow and Leeds areas on the 14th, over East Sussex on the 22nd, East Anglia on the 23rd, west Cornwall, and Kent on the 24th and Fife, the Thames Valley, eastern Kent and the Isle of Wight on the 25th, and was accompanied by hail over south-west England, South Wales and the Isle of Wight on the 21st and Cumbria and Lancashire on the 23rd. Hail was reported over North Wales on the 18th, the Isle of Man and Salisbury Plain on the 20th, Devon and Cornwall on the 23rd and west Cornwall on the 25th.

December 1990.

On the 7th and 8th snowfall was very heavy over northern England, Wales, the Midlands and south-west England, with heavy drifting in gale-force winds, causing considerable disruption to traffic of all sorts and cutting power lines. The snow did not freeze, however, but melted very rapidly during the next few days, as the temperature rose a little. On the 11th and 12th storm force winds swept down the North Sea. From the 23rd until the end of the month very strong winds and bands of rain, often prolonged and heavy at times, crossed many parts. On the 25th and 26th gales and storm force winds affected many areas. Gusts of more than 70 kn were reported at Langdon Bay, Kent, Camborne, Cornwall and Plymouth, Devon and on the 25th there were reports of tornadoes over Devon, Somerset and Avon. Sleet and snow were reported as far south as South Wales on the 27th and hailstones of 15 mm diameter were reported at Towy Castle, Dyfed. On the 29th a whirlwind caused extensive damage to houses in Gorseinon, South Wales, and a cottage in North Wales was hit by lightning. Towy Castle reported a whirlwind crossing the station with a maximum height of 35 m at 11 h on the 30th. Brooms Barn, Suffolk reported the coolest December since 1982.

January 1991

The weather was frequently stormy during the first week, with strong winds, rain and snow, and long sunny periods in between. On the 5th, gales coupled with high tides caused extensive and costly damage to parts of western and southern coasts from the Solway Firth to Sussex, as the sea breached defences. There was considerable flooding in many areas and disruption to power supplies and transport, especially in the west. After the 10th the month was generally dry, although there was rain in many places between the 17th and 20th, and snow in some western areas on the 30th and 31st. Thundery outbreaks were frequent and widespread between the 3rd and 7th. There were isolated reports of thunder on the 9th and 10th and a broad area of thundery activity over south-east England on the 11th.

February 1991

February was unsettled throughout, with cold weather during the first half and frequent falls of snow. Between the 6th and 14th snowfall was heavy in many places and it became very cold for a few days. After mid month it became somewhat milder, although remaining generally wet and at times windy. On the 8th there was some thundery activity over eastern parts of England. A thunderstorm was reported to the west of London during the 27th. Among heavy falls were: 133 mm at Llanymawddwy, Gwynedd, 125 mm at Moel Cynnedd and 101 mm at Lake Vyrnwy, both Powys, 81 mm at Machynlleth, Powys all on the 22nd.

March 1991

March was a very warm month, especially over central and eastern parts of England, although not generally as warm as March 1990. The first three weeks were wet, although rainfall amounts were greater in western areas, and some parts of the east and south-east had less than the normal amounts. It was a generally dull month, although with some sunny intervals, mainly in the south. A tornado hit part of south-west Wales early on the 3rd, causing considerable damage. On the 6th the temperature rose to nearly 15° C in southern England, and 17°C was recorded at Saunton Sands, Devon on the 7th. However, easterly winds off the North Sea gave cold and foggy weather to north-eastern coastal areas between the 6th and 9th. An outbreak of thunder gave more than 13 mm of rain in a couple of hours in Essex on the 16th.

April 1991

Monthly rainfall was above average in much of the west and south of England and Wales, with much of the rain falling during the last week. North-eastern England, on the other hand, was dry, with some places having only half the normal rainfall. The month began unsettled, with rain or showers during the first week, and some sunny intervals. The 4th and 6th were windy days with heavy rain; gusts reached more than 60 kn on both days. On the 8th pressure began to rise and temperatures rose over a large area, reaching more than 21 °C in a number of places in the south and east. However, coastal fog persisted along southern coasts and rain was often prolonged and heavy over western areas. the second half of the month brought a wintry mixture of hail, sleet and snow showers, with longer periods of rain and a few sunny intervals. On the morning of the 21st a damaging frost occurred in parts of south-east England as temperatures dropped as low as -4°C. Rainfall amounts were generally small until the last two days of the month when large areas of the south had heavy rain. Totals well over 25 mm were measured, doubling the month's totals in parts of the south-east, with a number of places having their wettest April day this century on the 29th.

May 1991

May was a generally dull month, with only average temperatures. Many eastern and northern areas had one of the dullest Mays this century. Almost all areas had below normal rainfall amounts and some places in the west had their driest May on record. Rain came to the north and east during the first week. At the start of the second week showery activity continued in the north and on the 7th locally heavy thundery showers fell over parts of England and Wales. A brief spell of fine weather during the second

week gave some sharp overnight frosts with temperatures down to -3°C locally. The weather became more changeable on about the 10th, with milder westerly air predominating. By the 14th pressure was building in the west and a large anticyclone to the south- west of Great Britain dominated the weather during the second half of the month.

June 1991

June was one of the dullest, coolest and wettest this century over a wide area. Sunny days were mainly limited to the 3rd and 13th in the south-west of England and the 20th more widely across England and Wales, apart from the south-east. The number of days of measurable rain falling during June was as high as 25 in a number of places, including London. Measured daily rainfall exceeded 10 mm somewhere in the British Isles every day except the 20th. Cellarhead, Staffordshire had 26 mm of rain on the 15th, but the wettest period was the 23rd and 24th, with more than 20 mm at many places in the south on the 23rd and 43 mm at Teignmouth, Devon. Frost occurred quite widely during the first week. Bastreet, Cornwall had a minimum of -1°C on the 2nd. The temperature on the grass at Birmingham Airport fell to -6°C on the 5th and a number of places had their coldest June night since records began. The last week saw temperatures rise to over 20°C at a number of places, but generally it was not possible to describe any day during June as warm.

July 1991

July was generally cool, the weather for the most part unsettled, with rain at times, often prolonged and heavy in places, or showers, sometimes thundery, but with some brighter interludes. It was a very wet month in southern parts of England and Wales with twice the normal rainfall recorded over parts of central and south-eastern counties and the far west. Most rainfall was in East Sussex and the Isles of Scilly where amounts reached three times the normal, whereas much of northern and eastern England had quite a dry month. The month was very dull in the south-west, in some places the dullest July for more than 40 years, whereas some parts of eastern England had about twice the normal amount of sunshine. It was very warm on the 29th, reaching 29°C at Heathrow Airport during the afternoon; however, thundery outbreaks came to south-west England and South Wales, while a band of rain moved north-eastwards and became slow moving over the Midlands and East Anglia overnight. The rain was prolonged and heavy in places, with 50 mm of rain measured at Elmdon, West Midlands. Later on the 30th over most of England and Wales it became more settled, with bright intervals, although there was further scattered thundery activity. Most places were dry on the 31st.

August 1991

August was generally a warm month, with below normal rainfall amounts nearly everywhere, giving generally the driest August since that of 1976. Most places, other than some parts of northern England, had no rain after the 23rd. August was the driest at Valley, Gwynedd since 1976 and at Coventry, Warwickshire since 1947. Monthly sunshine amounts were above average nearly everywhere and were generally higher than those of August 1990 in north-western England. Very moist air brought cloud and mist and kept sunshine amounts as well as temperatures low in some places in the west, and fronts soon weakened as they moved south- eastwards, giving negligible amounts of rain in the east. However, thundery showers produced localized heavy rainfall, and on the 1st thunderstorms over East Anglia and south-east England caused flooding and disrupted traffic: lightning killed one person in Kent, injured two people in Essex, and caused structural damage in south-east London.

September 1991

September was a warm month, especially in the south, and generally dry, although the second half of the month saw some areas of heavy rainfall. Nevertheless, sunshine amounts were well above normal nearly everywhere; during the first 12 days of the month there were daily sunshine totals in excess of 10 hours over a wide area. Many places had the warmest September for 30 years. The highest temperatures occurred during the first week. High pressure predominated during the first fortnight, continuing the pleasant summery weather of August, but with an increase in the formation of overnight mist and fog. However, the fog generally cleared during the mornings to give plenty of sunshine. The second half of the month became less settled and cooler as areas of low pressure affected the country, but southern parts remained warm until the last week. The rainfall on the 14th was the first rain in 32 days at Charing, Kent (since 12 August). Cooler air reached all parts on the 24th. Thundery showers on the 26th, some with hail, brought the first heavy rain of the month to many parts of England, but on the 28th and 29th rain was widespread and heavy, and included heavy falls in 24 hours of 96 mm at Velindre, Powys, 77 mm at Bournemouth (Kings Park), Dorset, 73 mm at Tivington, Somerset, 60 mm at Tredegar, Gwent and 53.1 mm at Llangenny, Powys on the 28th.

October 1991

October was a dull month in most areas, especially near northern and eastern coasts. The month began with temperatures around 18°C in many places in the south-east, but about 8 degrees colder in the north-west, and reached around 20°C in many areas on the 10th, before dropping gradually to near normal values. By the 20th there were some cold nights with ground frost and even air frost here and there. On the morning of the 21st Bedford recorded its lowest October temperature since its records began in 1957. The month was wet in western and northern areas but dry in central and eastern areas. For the most part over England and Wales there was a distinct division between west and east, with rain falling frequently in western areas, while some places in the east, especially away from the coast, had very little rain: several places in East Anglia, for instance, measured less than 2 mm during the period. The wettest period was between the 7th and the 9th, with between 20 mm and 30 mm measured in many places, and about 70 mm over the three days in parts of Wales. One or two places in eastern areas, including Gatwick, West Sussex and Ulcombe, Kent had little rain from the 16th until the 28th. Many areas had a wet and windy 24 hours on the 31st, with Winterbourne, West Midlands reporting serious local flooding on roads in Birmingham City Centre after heavy rain, while Bidston, Merseyside reported torrential rain until 1800 on the 31st with flooding on roads.

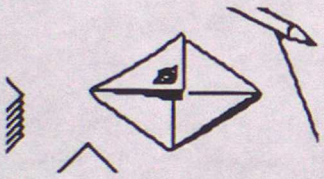
November 1991.

November was a wet month over northern and north-western parts and very dull in the south. The first week was showery with hail and thunder around southern and western coasts and, as winds turned more northerly, the showers

turned to snow over hills from Snowdonia northwards. The last two weeks of the month were generally quieter with some overnight fog as high pressure crossed all areas, but the 19th was a notable exception. The changeable weather ensured that the fog was not too widespread, except during the quiet spell in the middle of the month, and gales were generally confined to the northern and western coasts, so that it was generally typical November weather. November 1991 was the warmest November since 1986 over parts of England, and for many places the wettest November since 1987. The Midlands and south had some heavy rain on the 18th and 19th, some places having over half their monthly total during this 2-day period. On the 12th a tornado was reported at Dullingham, Cambs..

December 1991

Most parts of England and Wales were dry during the first two weeks and for the first few days it was dull in the south. Clear skies in parts of northern England led to some dense overnight fog patches which were slow to clear during the day. The 6th was a sunny day over England and Wales. During the second week easterly winds brought colder air from the Continent and a combination of very light winds and clear skies overnight produced some severe frosts over England. Freezing fog patches formed overnight and they persisted in some places during the day with temperartures staying below freezing; the Midlands and north were particularly badly affected and on the 11th temperatures stayed at or below freezing over much of England and Wales throughout the day. On the 13th freezing fog became widespread in the south and it persisted in some places on the 14th. The cold weather gave way to mild Atlantic air during the 16th and 17th, bringing rain to many places, with much of England and Wales having their first significant rainfall of the month. Very disturbed and windy weather, with successive bands of rain moving rapidly eastwards, alternating with sunshine and showers, continued until the 23rd, a very windy day, with gusts of over 60 or 70 kn in places from west Wales to Kent. From then until the last day of the month high pressure returned to England and Wales, bringing plenty of dry weather and some overnight fog and frost in places. On the 31st a band of rain brought unsettled weather once more to most areas.



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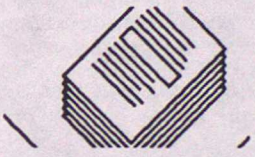

DOES HIGH PRESSURE HOLD THE KEY TO GLOBAL WARMING?

Ever since I became curious about the many aspects of British weather and wanted to know more, it soon became apparent that there was a continuous on-going debate re possible climate change.

Up to the 1940's the general assumption was that our climate had slowly been warming up since the turn of the century and the collated figures from weather and climate stations the length and breadth of the country supported this view. There had only been two very cold winters since 1894/5 and they were 1916/17 and 1928/9.

Then came the 1940s with three cold winters in succession, 1939/40 - 1941/2, a cold January in 1945 and the very cold, snowy winter of 1946/7. It was these winters that fired my lifelong interest in weather.

During the 1950s and 1960s there was much speculation about a global downturn in temperatures, and, after the prolonged very cold winter of 1962/3, such speculation was quite believable to 'the man in the street'!

Finally, most scientists now accept the global warming theory, 'The Greenhouse Effect', due to carbon dioxide emissions etc. caused by the activities of Man.

Is there anybody there at Bracknell who could answer a question that has been nagging away inside my head for years? That is:-

During the great heat-wave of June/July 1976, with a persistent anticyclone anchored over the Southern North Sea, warm southerly winds were being advected over the UK on its western flank. Conversely, cold northerly winds on its eastern side gave Russia some unusaully cold, inclement weather. Therefore, I reasoned, inhabitants of the UK and the USSR would have quite different interpretations regarding climate change at that particular juncture.

A succession of winter seasons, say, with persistent belts of high pressure to the N and NE of the UK, with a consequent easterly airflow, might tempt us all to believe that our climate was cooling down and supporting figures from weather and climate stations would mirror and help to prove our assumptions.

I can only conclude that worldwide statistics, collated together, iron out temperature differentials caused by high pressure systems and that temperature negatives are not so extreme nowadays as in former decades and that warm air invasions from southern latitudes around blocking anticyclones register higher temperature values than formerly?

MR G A SOUTHERN PRESTEIGNE

From Mr G Lupton, Co-ordinating Team,
HADLEY CENTRE FOR CLIMATE PREDICTION AND RESEARCH

Dear Mr Southern

Thank you for your letter concerning climate change. It has been handed to me for a reply.

I agree with your well presented article that what appears in one part of the world as one man's warming is another's cooling and people, in general, tend to remember the later years and notice how the weather has changed since the days of their childhood. You have been more thorough than that, by examining the records, you have been able to

identify warm and cold episodes in the UK over the last century and, in particular, you have pointed out that the warm southerly airflow over our islands is compensated by northerlies elsewhere. This is not always recognised.

Much research, however, has been conducted at this Centre, and elsewhere, to examine, in great detail, the millions of observations that have been gathered over the last century and a half from the whole of the globe. Observations from ships of sail in the middle of the last century have to be compared with those taken from the huge steel supertankers of today. Careful consideration has to be given to many factors including the faster movement of today's vessels, introducing more cooling over thermometers used to measure temperatures but this effect may be offset by the heat emitted by these massive modern structures. Over land areas, different methods of measuring temperatures in various countries have to be taken into account, as do changes of site.

The final assessment is usually arrived at by considering as many factors as possible and a global average temperature calculated for each year. Although there are fluctuations in the upward march of this index, the accepted principal of a global warming has been established and it is generally considered to be in the order of about 0.5 degrees Celsius over the last 100 years.

I hope this will go some way towards answering your questions.

MINEHEAD

In response to your 'only ONE letter!!', I offer a small contribution. I am new to observing so this is for all new arrivals.

On pages 5 & 6 of Metform 3100A there are instructions for recording Max and Min temperatures on Metform 3208B. Each instruction contains an important little word, in bold type ie. MUST.

One day, by chance, I noticed my entry did not comply being one tenth of a degree on the wrong side of a dry bulb reading. I decided I must get into the habit of checking the four temperatures against each other.

The enclosed gadget may be of use to beginners, like me. It is placed over the 3208B after the entries are made and, on the rare occasions when the Max or Min are close to the Dry bulb temperature, any small error can be easily detected. It is also useful in preventing crossed eyes when doing a final check at the end of the month!

Eric Marrison

We have produced copies of this very useful temperature gauge and send it to you as a

FREE GIFT (ED.)